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R. K. KISTE

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# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



Underwater Envelope  
See Page 242

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## ROCKETS AND MISSILES

# Navy Plans New Missile

► THE NAVY has put in its bid for a place in developing this country's space technology with a missile capable of destroying a satellite.

In testimony given to the House Committee on Science and Astronautics, Capt. Robert F. Freitag, astronautics officer in the bureau of naval weapons, said the Navy believes it can develop such an anti-satellite weapon within 18 months.

Capt. Freitag referred to the weapon as "a minimum energy missile" that would be "launched vertically with just enough power to arrive at the latitude of the satellite at zero velocity." The missile would be designed to hover and wait at that point for the satellite to come. By terminal guidance, it then would seek out the satellite and destroy it.

"This type of thing could be done very simply," Capt. Freitag said. "We believe within a year and a half, for example, we could destroy one of our own satellites as a demonstration of this capability."

The Navy was bolstered in its bid for space place by its traditional inter-service rival, the Army. Lt. Gen. Arthur G. Trudeau, Army chief of research and de-

velopment, said he believes "space is too important to be entrusted to one service."

All three services "have real talent and competency in this field," he said, urging a joint military space agency under the Department of Defense. Gen. Trudeau said command of such a proposed joint agency should be rotated every few years.

He also spoke strongly for the Army's right to space rule, declaring "the Army has the capability of developing satellites for almost any military purpose." He suggested that the Army has potential capabilities for such aspects of space as lunar construction and surface mobility which "are not now being employed."

The Navy has been turned down by the Defense Department on a request for authority to develop a tactical weather satellite and develop the Polaris as a satellite launching vehicle. The Navy's Sea Scout program designed to permit the sea launching of satellites still is not approved, but here the Navy still has hopes.

The Army-Navy bid for space employment so far has not been recognized by the Administration. The Air Force still soars in command of the wild blue yonder.

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## ROCKETS AND MISSILES

# Solid-Fuel Rockets Issue

► SOLID-FUEL ROCKETS were a burning issue at Congressional hearings on budget appropriations for space.

There has been considerable testimony by responsible experts that solid-fuel rockets can propel the United States ahead of the Russians in their capability of launching heavy vehicles. This potential is virtually ignored in official U.S. plans for space development.

The current budget for the National Aeronautics and Space Administration allots \$3.1 million for research and development of solid-fuel boosters compared to more than \$99 million for liquid-fuel rockets. The investment in liquid-fuel rockets was increased by the Kennedy Administration by more than \$20 million.

This dependence on liquid-fuel rockets has persisted within NASA despite demonstrations borne out by independent industrial research that the solid-fuel engines can be produced at one-third the cost and in considerably less time than that estimated for their liquid-fuel counterparts.

Concerned observers have attributed the lag in NASA in solid-fuel development to excessive reliance on the German scientists, proponents of liquid-fuel engines, who presently dominate NASA's booster development.

Among these is Dr. Wernher von Braun, known for his work on the V-2 rocket with which Hitler hoped to conquer the world. Dr. von Braun now is director of NASA's

Marshall Space Flight Center at Huntsville, Ala., where large booster development is concentrated.

Although an expert in the liquid-rocket field, Dr. von Braun has had little direct experience with large, solid-propellant rockets. His success with the Redstone liquid-fuel booster in Project Mercury demonstrates his mastery of liquid-fuel propulsion technology.

Largely upon his recommendation, the Saturn C-1 vehicle, a three-stage liquid rocket of one and a half million pounds of thrust designed for heavy space loads to be operational in 1964, is getting the largest share of NASA funding for large booster research and development.

United Technology Corporation, a subsidiary of United Aircraft Corporation, independently sponsored at a cost of \$5.5 million the development of large, solid-propellant rocket engines of conical segmented design that successfully fired with one-quarter million pounds thrust in July, 1960.

This company contends that if it had depended upon Government sponsorship and support for this project, it would be waiting still. The two-stage rocket is uncomplicated. Its fuel is safe to handle. And the rocket can be easily assembled. Tests have demonstrated its high reliability.

Proponents of solid-fuel propulsion insist that concentrated effort in research and development in solid-fuel rockets would

yield a booster with a larger and more reliable launch capability sooner, more than two million pounds of thrust by 1964.

They point to the fact that solid propellants are used now in the upper stages of almost every U.S. rocket flight made and are the basis of the escape system for Project Mercury.

Rep. Victor L. Anfuso (D-N.Y.) and Rep. David S. King (D-Utah) have sponsored a bill calling for authorization of \$30 million for research and development of solid-fuel boosters. They are members of the House Committee on Science and Astronautics before whom the hearings on appropriations for NASA were held.

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## ROCKETS AND MISSILES

# Death Predicted for U. S. Balloon Satellite

► THE DEATH of Echo 1, the United States' 100-foot balloon satellite, was predicted at a meeting of the International Committee on Space Research in Florence, Italy.

September, 1962, July, 1963, or May, 1964, are the most likely times for Echo to die, Dr. Pedro Zadunaisky of the Smithsonian Astrophysical Observatory, and Drs. Irwin I. Shapiro and Harrison M. Jones of the Massachusetts Institute of Technology reported. Echo will die when it comes close enough to the earth to become captive of the denser layers of the atmosphere.

For an ordinary satellite, the death prediction can be made more exactly because its perigee (the closest distance to the earth) falls continuously.

Because of its large size compared to its weight and the high altitude, the effect of solar light pressure is able to counterbalance the atmospheric drag effects on Echo and can even cause perigee to rise. The rising effect is periodic, however, so the satellite probably will perish on one of the dates aforementioned. Best estimates favor July, 1963; Echo was launched in August, 1960.

The scientists received their data on Echo from photographs taken by the Smithsonian's Baker-Nunn satellite tracking cameras located around the world. Information also was gathered from radio and telescopic observations, particularly from the Observatory of Paris at Meudon, France.

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## ROCKETS AND MISSILES

# Gaseous Envelope Speeds Underwater Missiles

## See Front Cover

► A GASEOUS ENVELOPE such as the one shown around the torpedo on the cover of this week's SCIENCE NEWS LETTER may double the speed of underwater missiles.

Experiments at Convair Division of General Dynamics Corporation, San Diego, Calif., show that much of the skin friction drag of a hydrodynamic body can be eliminated by the vapor envelope.

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## ASTRONAUTICS

# Russian First Man in Space

Russia has put the first man in orbit around the earth and returned him safely. The USSR is expected to beat the U.S. to the moon by about five years, Lillian Levy reports.

► THE RUSSIANS put the first man in orbit and returned him safely. A Soviet Air Force major, father of two, has circled the earth in 89.1 minutes, and come back, the official Russian news agency Tass reported. The height of the orbit varied from 110 to 188 miles.

Maj. Yuri Gagarin, 27, landed at 2:55 EST, April 12, without suffering any harm, it was reported. Maj. Gagarin, a reserve officer, has been in training similar to that which the United States astronauts have been given.

The Soviet success in orbiting and recovering a man from space means that they can get a man on the moon in four or five years, and probably will. The best the United States can hope to do is get an American to the moon in 1971, according to an estimate by the National Aeronautics and Space Administration.

"The significant and exciting role of man (in space) lies in the exploration of the moon and planets," Dr. Lloyd V. Berkner, chairman of the space science board of the National Academy of Sciences, has written.

## POLITICAL SCIENCE

# Red Bloc Causes Stall?

► PRESSURES from the Communist International may be forcing the Soviet Union to delaying tactics in the current East-West negotiations for a cessation of nuclear arms testing in Geneva.

Informed observers say that the Soviets genuinely favor an agreement and are themselves willing to make concessions to match those made by the United States and the United Kingdom. However, Communist China, Bulgaria, Hungary and other of the Communist bloc countries where there is economic unrest and internal political struggles for power are against an easing of tensions.

In these countries, a relaxation from the threat of atomic military build-up in the West might threaten the security of those now in political power who do not have united internal support.

The USSR needs support from the leadership of the countries under its domination, and this support may be weakened if the satellites have internal unrest.

The more politically secure Communist bloc countries such as Poland, Yugoslavia and Czechoslovakia favor a ban on nuclear testing. The Polish Government, in fact, has proposed the Rapacki plan for disarmament for Poland, East and West Germany, and Czechoslovakia, in which full inspection of all states involved is an integral part of the plan.

The first step leading to the moon and the planets is the orbiting of man, Dr. Berkner noted.

The Soviet success in achieving this first step has underscored the lag in U. S. space booster capacity. Initial Congressional reaction to the Soviet man-in-space indicates that great pressure will be placed upon the scientists responsible for the Government's space program to accelerate plans and schedules for orbiting a U. S. astronaut.

Perhaps the lowest blow dealt to those working in the U. S. space program came from Rep. James G. Fulton (R-Pa.) who said America "should get some space enthusiasts who are willing to take some risks." The Pennsylvania Republican, ranking minority member of the House Committee on Science and Astronautics, said he would be willing to take a trip right now aboard NASA's Mercury Space capsule scheduled to take a man in suborbital flight in the next few weeks, implying that the Mercury astronauts lack enthusiasm for the venture.

This is bitterly resented by the space men

and the scientists and technicians working in Project Mercury.

The blame for the lag certainly cannot be attributed to a lack of enthusiasm on the



**FIRST SPACE MAN**—A Soviet Air Force major, Yuri Gagarin, is the first man to fly above the earth's atmosphere, USSR agency Tass reports.

part of the Mercury astronauts, each of whom has said many times that he is ready and willing to fly in space the moment the signal is given.

Lack of imagination on the part of Government leaders, including many of the Congressmen now calling for more effort in space, is partly to blame for our lag in space. Failure to develop adequately new chemical advances, particularly in the area of solid fuels for rocket engines, is seen as another reason for the lag.

The value and potential of solid fuels in rocket development was called to the attention of the House Subcommittee on Appropriations in June, 1958.

The reliability of solid fuel boosters was stressed by Dr. Homer Newell, vice-chairman of the IGY U. S. technical panel on rocketry. Dr. Newell now is NASA's deputy director, office of space flight program. But the present NASA space budget allows only \$3.1 million to research and development in solid fuel propulsion systems as compared to more than \$99 million for liquid fuel.

Scientists, experts in the field, claim both time and money could be saved by greater utilization of solid-fueled engines. Combining this technology with advances established in liquid-fuel rockets would yield a propulsion system that could outstrip present Soviet thrust capabilities within three years. But the present Administration, like that preceding it, has decided to continue concentration on liquid fuel rockets.

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## ASTRONOMY

# Moon Like Hollow Sphere

► THE MOON is like a hollow sphere, heavier on the outside than on the inside, according to data from the Vanguard satellite and theories about the moon.

Most scientists believe the moon is denser in the interior but it could possibly have become heavier on the outside from heavy meteors falling on the surface.

When man gets to the moon, he can find out more about both how the earth and the moon were formed, Dr. Gordon J. F. MacDonald of the National Aeronautics and Space Agency reports. He believes the moon was originally hot because its radius has not changed much since it was formed.

This he concluded from studies of photographs of the moon. He said none of the moon mountains (craters) showed one side had moved relative to the other as they would if the radius had changed.

Several theories have been suggested to explain how the moon began moving around the earth. Dr. MacDonald believes the moon may have been "captured" by the earth about a billion years ago.

In that case the moon might have been a small planet coming close to the earth in its travels around the sun. At one point as

it came close to earth, under special conditions involving the relative motions of the earth, the moon and the sun, the moon could have been captured. It could also have come from the asteroid belt (a belt of small bodies believed to be scattered parts of a larger one).

The moon is moving away from the earth at about one half inch a year. The possibility of the moon's capture is based on the assumption that the moon has been moving away from the earth at a steady rate, Dr. MacDonald says.

If the moon's receding rate has changed as the moon moved away, another theory is plausible, namely that the moon was created at the same time as the earth, and nearby, and has moved around the earth since it was formed.

A third theory was developed by George Darwin, son of Charles Darwin who developed the theory of evolution. This theory suggests that the moon was drawn out of the earth in a huge chunk.

Dr. MacDonald gives a complete discussion of possibilities for the earth-moon relationship in *Science*, 133:1045, 1961.

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These results, the work of Imre G. Izsak, also of the Observatory, mean that the earth may have either irregularities in shape or vary in density from place to place, the scientists said.

To locate these irregularities geometrically within 30 to 50 feet, artificial satellites are being observed from 12 precision satellite tracking stations located around the world. Other stations are being added to the system. When the geodetic coordinates of all the countries of the world are united in one system, results will be ten times again more precise than those known today.

The work of the Observatory, originally a part of the International Geophysical Year, now is supported by the National Aeronautics and Space Administration.

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## ICHTHYOLOGY

# Light Kills Fish Embryos

► LIGHT IS A DEATH RAY when it strikes the eggs and developing embryos of salmon and trout. It can kill in just a few minutes, and it probably is just as deadly to the sensitive young of all other water-dwelling animals, a New York biologist believes.

When the death rate among brook trout eggs at the New York State hatchery, Cold Spring Harbor, suddenly shot up to 90% from 10% in November, 1959, Dr. Alfred Perlmuter of New York University discovered that the culprits were the 40-watt fluorescent bulbs in the ceiling.

Another investigator, working with rainbow trout, found that the violet and blue components of white or visible light are more deadly than the green, yellow and orange bands.

Direct sunlight is known to kill salmon and trout eggs, and it might be inferred from this that ultraviolet light is responsible. But indirect light, with no ultraviolet, has also killed sockeye salmon eggs and embryos.

On this basis, Dr. Perlmuter suggests that visible light is potentially lethal to all water-dwelling animals and that these species have survived only because they have been able partially to shield themselves from light.

In nature, he states in the journal *Science*, 133:1081, 1961, fish eggs may be shielded by gravel, a nest, the parent's body or the shadow of rock crevices or abandoned sea shells.

A large number of fishes spawn when the weather is rainy and the water turbid and dark. Even the eggs themselves are colored, more so in nature than in the hatchery, and color cells develop over the vital parts of the embryo.

When the spawning season includes a long period of clear, sunny weather, Dr. Perlmuter states, it is a safe bet that fewer young fish will survive.

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## GEOLOGY

## Earth's Shape Is Far From Smooth

► THE EARTH'S SHAPE now can be determined with better precision than ever before, using artificial earth satellites, Drs. Fred L. Whipple and George Vees of the Smithsonian Astrophysical Observatory, Cambridge, Mass., reported in *Florence*, Italy.

For the first time, scientists can measure the shape and size of the earth with a precision of from 30 to 50 feet, they told a symposium before the International Committee on Space Research meeting. This is ten times better than pre-satellite techniques using older methods of geodesy, such as gravity measurements and precision position determinations by star observations.

Analysis of satellite motions has shown earth irregularities from pole to pole. The equator itself is not a circle but elliptical.

## PSYCHOLOGY

# Drink and Still Think

► DRINKING ALCOHOL does not necessarily muddle your thinking. In fact, your ability to solve very difficult reasoning problems may not be damaged as much as your ability to walk a straight line or to drive your automobile.

This conclusion, based on experiments conducted under a grant from the U. S. Public Health Service, was reported to the meeting of the Eastern Psychological Association in Philadelphia by Drs. John A. Carpenter, Omar K. Moore and Edith S. Lisansky, all of Yale University, and Dr. Charles R. Snyder, now at Southern Illinois University.

In the Yale experiment the men taking part drank various amounts of 90-proof whisky mixed with soda. The liquor was consumed on an empty stomach and all within 15 minutes. Then they were required to solve difficult problems in the calculus of propositions.

Not until the dosage of alcohol reached one milliliter of absolute alcohol per kilogram of body weight did the drinking have any adverse effect on problem-solving ability. This is equivalent to six ounces of pure 90-proof whisky for a man weighing 180 pounds.

At some of the smallest doses of alcohol there was an actual improvement in solving the difficult intellectual task.

No one yet knows how alcohol affects the solving of simpler problems or reasoning that is even more difficult.

Very little scientific work has been done on the effect of alcohol on various kinds of intellectual tasks and much of what is generally believed is really in error, Dr. Carpenter said. Research in this field is badly needed, he added.

It is widely believed, for example, that alcohol is relaxing; it is often prescribed by physicians to relax tense, keyed-up patients. These investigators found no evidence to indicate that alcohol actually has a relaxing effect. What they did find was that alcohol is probably more damaging to motor and sensory abilities than to the "higher" thought processes.

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## Reading Difficulties

► IF JOHNNY cannot read, the fault may not be with his teacher or the method by which he was taught whether the phonics method or the "see and say." He may be having difficulty with his mental health, Dr. Franklin H. Goldberg of the New York University Reading Institute reported to the Eastern Psychological Association in Philadelphia.

Dr. Goldberg studied 32 boys who were from one to four years retarded in their school work. The boys were not all stupid, Dr. Goldberg found. Although some were "dull-normal," some were superior in intelligence. Most of the boys were of average intelligence. Of the boys studied, 56% (18

boys) were found to have mental health difficulties.

Dr. Goldberg studied the personality characteristics of these retarded boys. The typical retarded reader, he found, is an immature, frightened and unhappy boy who does not enter actively into relationships with boys his age because of deep-seated feelings of inadequacy and failure.

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## Compatibility Test

► IF A MAN and his wife can see the same kind of pictures in the shapeless blots of the Rorschach ink blot test, this reveals to psychologists that the marriage will be a happy one.

To some individuals one blot may look like a young girl dancing or a man running for a train, while to others the same blot may look like a pool of water or an odd-shaped table or other motionless object. If both members of the couple see a similar number of scenes with human movement, the chances are good that the marriage will be happy.

This new measure of compatibility was reported to the Eastern Psychological Association.

ciation by Drs. Barry Bricklin of the Jefferson Medical College of Philadelphia and Sophie G. Gottlieb of Teachers College, Columbia University.

When couples were interviewed and treated by a psychiatrist and then divided into two groups according to whether they improved most or improved least in compatibility, the two groups matched exactly two groups who had the highest and lowest Rorschach compatibility scores.

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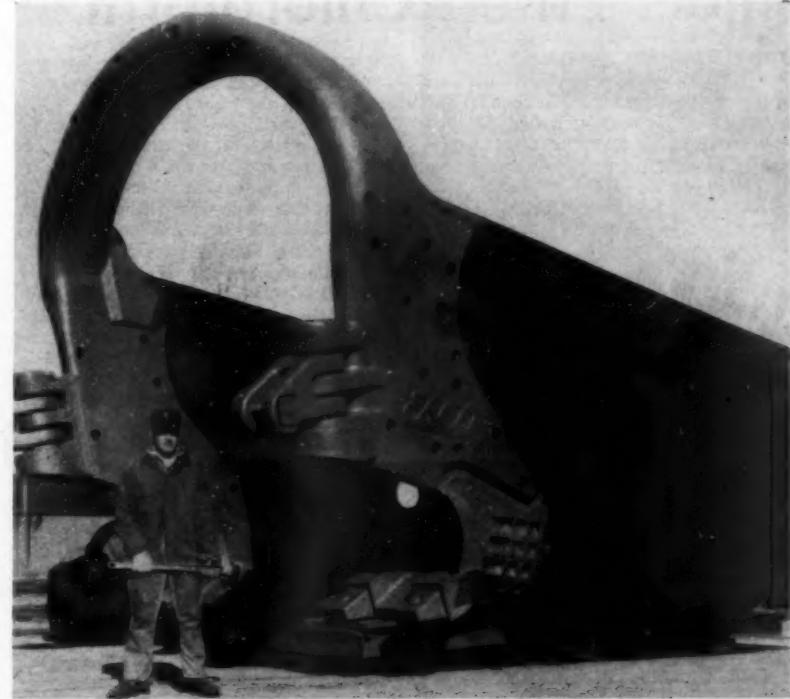
## Better Training Method

► A BETTER METHOD of training mail-order clerks has been found by two psychologists—self-instruction instead of classroom instruction.

The psychologists took a two-week training course as billers in a mailroom, then prepared self-instruction workbooks covering what they had learned. They found that the kind of "programmed learning" given by their books was superior in some ways to the usual classroom training of mail-order clerks during the Christmas rush.

Drs. A. E. Hickey and B. Jean Anwyll of the Itek Corporation, Waltham, Mass., reported results of their experiment to the Eastern Psychological Association meeting in Philadelphia.

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**BIGGEST BUCKET**—The biggest drag bucket, capable of lifting 50-ton loads, is constructed of steel plate up to five inches thick. It can dig materials 170 feet below ground level and cast it on a pile up to 110 feet high and 425 feet away. The 70,000-pound bucket, built by Esco Corporation, Danville, Ill., will be used at a coal stripping mine in Brazil.

## BIOLOGY

## Clue to Photosynthesis

► A SIGNIFICANT STEP toward unraveling the intricate chemistry of photosynthesis may have been taken.

Dr. Andrew A. Benson of Pennsylvania State University told scientists at the annual meeting of the Federation of American Societies for Experimental Biology in Atlantic City that a substance resembling a common household detergent may hold the key to how sulfur is used in photosynthesis.

Photosynthesis is the process by which the green leaves of plants remove carbon dioxide from the air and convert it to growth material and to free oxygen. The entire animal world depends on this process for the continuation of life, for the production of all the food we eat and the oxygen in the air we breathe.

"For almost three years, we refused to believe that a plant could produce this kind of compound," Dr. Benson said. "But experimental evidence mounted and recently pure crystals of the sulfur compound have been isolated from alfalfa and spinach leaf extracts."

Dr. Benson said the compound—a sulfonic acid derivative called a sulfosugar—

was found in the portion of the leaf which contains chlorophyll, the material that converts the energy of sunlight into biochemical energy.

Detergent molecules consist of two functional parts: one end that is soluble in water, the other end soluble in oil. The cleansing action lies in the solubility of grease in the oil portion, both of which are carried away by the flow of water. Thus, clean clothes.

Dr. Benson thinks the compound discovered in his laboratory might work the same way. The two ends in combination "are able to dislodge and transport many substances in a liquid medium."

Because photosynthesis involves the reactions of multiple water-soluble and oil-soluble substances, the sulfosugar molecules may act as shuttles, directing other substances to parts of the plant cell where their particular aspect of photosynthesis occurs.

The discovery of this sulfosugar seems to provide much of the answer to how sulfur is used in photosynthesis. For years, the role of this atom puzzled photosynthesis researchers.

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## BIOLOGY

## Inject Ether, Chloroform

► DOCTORS CAN NOW anesthetize their patients by injecting anesthetics such as ether and chloroform, formerly used only as inhalants, scientists attending the Federation of American Societies for Experimental Biology meeting in Atlantic City, N. J., learned.

Dr. John C. Krantz Jr. of the University of Maryland School of Medicine, Baltimore, told colleagues that patients can now be "put under" faster and the cumbersome face masks can be eliminated with this new injectable form of the volatile anesthetics.

The standard, non-volatile, injection anesthetics are acceptable for short-duration surgery, he said, but the old volatile inhalants are more dependable for lengthy operations, and scientists have been searching for an injectable form for years.

The main stumbling block has been the fact that these agents do not dissolve well in the normal salt solution.

Dr. Krantz and his co-workers tried using

the anesthetics dissolved in oil and emulsified in a sugar (glucose) solution, and they finally found the right combination.

The anesthetic used was methoxyflurane, a methyl ether, and the emulsifying agent was "lecithin and Pluronic F 68." This particular emulsion is stable for several months, is compatible with the elements of the blood, is easily sterilized, affects blood pressure only slightly, works quickly in small amounts and lets the patient recover rapidly with very few side effects.

The new emulsion has been used successfully on four persons, Dr. Krantz said, and one of them, Dr. Helmut F. Cascorbi, is a member of his own research team.

Both Dr. Krantz and Dr. Cascorbi believe that now that one injectable volatile anesthetic has been prepared, it will be a simple matter to prepare others. Drs. Martin Helrich, Raymond M. Burgison and Martin I. Gold, and Miss Frieda Rudo, concur.

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## BIOLOGY

## Brain Damage Seen

► THE UNSEEN FINGERS of atomic radiation can leave a lasting impression on the brain, scientists from the University of California, Berkeley, reported in Atlantic City, N. J.

As a result of their findings, future space travelers may have still another problem to consider before they can safely encounter

the higher radiation levels of interplanetary space. And atomic biologists may begin to revise some older opinions about the vulnerability of the brain, generally regarded as the most radiation-resistant part of the body.

Even a moderate dose of radiation can cause long-lasting changes in brain activity,

Drs. Fred Rosenthal and Paola S. Timiras reported at the Federation of American Societies for Experimental Biology.

During a six-month period, the scientists found, irradiated rats showed an increased degree of brain excitability and a lower ability to maintain heightened brain activity. The findings were obtained by using a standard pair of physiological tests to measure the susceptibility of the brain to electroshock convulsions, and by comparing the results from irradiated and non-irradiated animals.

When the California scientists applied the tests for six months after rats had been given a 500-roentgen "shot" of whole-body exposure to X-rays, they found:

1. A consistently lower electroshock seizure threshold, interpreted to mean that brain excitability is increased after irradiation.

2. A shorter period of total maximal seizure, suggesting a decreased ability in irradiated animals for maintaining heightened brain activity.

Cause of the radiation effects on the brain is still unknown, but may be related to hormonal changes or to altered nerve cells.

Whatever the cause, radiation changes in the brain appear to stay with the affected animal long after it has recovered from the more acute results of radiation sickness, such as the disorders of the gastrointestinal tract and of the blood.

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## Gauge for Heart

► THE PROBLEM of applying an accurate gauge to the heart's blood-pumping capacity has been solved by an ingenious method developed at the University of California, Berkeley.

The method may be applied soon to determine how the gravity-free conditions of outer space will influence heart performance. It is already showing promise in testing treatments used in medical practice.

Details of the new "automatic dye-dilution cardiac output determination" were reported by Drs. Julius T. Hansen, assistant research physiologist, and Nello Pace, professor of physiology, at the Federation of American Societies for Experimental Biology meeting in Atlantic City, N. J.

The main advantage of the new technique is fully automatic operation. Guesswork and the possibility of human error have been removed. Remote-control tests where the subject is free of external stimuli are now possible.

Synchronized with the subject's respiration, the new method also avoids previous errors that were due to the lungs' effect on the heart. And most important in repeated testing, the new method requires no permanent loss of blood.

Like earlier techniques, the new method employs a harmless dye injected into the blood stream and a "densitometer" to measure dye-intensity in the blood by means of a photoelectric cell. A complex control system that achieves full automation has been added by the California scientists.

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## MEDICINE

# Cure for Leukemia Found?

One of the causes and possibly a cure for leukemia may have been found. Leukemia patients are deficient in two necessary blood substances, Gloria Ball reports.

► ONE OF THE CAUSES and possibly, just possibly, a cure for leukemia have been found, a research team from Toledo, Ohio, reported to the Federation of American Societies for Experimental Biology in Atlantic City, N. J.

Dr. Bernard Steinberg, Dr. Frank H. Cheng and Ruth A. Martin of the Institute of Medical Research at Toledo Hospital have discovered that two blood substances regulate the production of platelets, the corpuscles that control blood clotting and hemorrhage. Leukemia patients, among whom more than 50% of the deaths are due to hemorrhage because there are not enough platelets, are deficient in one or both of these substances, the team has found.

One of these substances, now called megakaryopiesin, was found to manufacture and mature megakaryocytes, cells located in the bone marrow. Megakaryocytes manufacture platelets. The second regulator substance, now labeled thrombopiesin, controls production of platelets in the megakaryocytes.

Noting that leukemia patients have few or no megakaryocytes, as well as a low platelet count, Dr. Steinberg's team injected megakaryopiesin into several human patients no longer responding to any other treatment.

Megakaryocytes did form in the bone marrow, but they did not go on to form platelets.

When the second regulator substance, thrombopiesin, was then injected, however, the platelet count in the leukemic patients went up to normal and one or two injections kept it there for two to four weeks.

It may be that this technique is a cure for leukemia in the sense that insulin is a cure

for diabetes. At present, however, Dr. Steinberg is unwilling to call it "cure," fearing that he will be deluged with requests from leukemia patients. When asked by SCIENCE SERVICE how many persons had received the injections, he would only say "a few, more than ten."

He does say this: "These experiments show that the two regulators are necessary to restore the platelet content to normal in patients with leukemia. The experiments were not designed to evaluate this particular treatment of leukemia."

The purpose of the study was to determine if a deficiency of these regulators exists in leukemia and whether the administration of the regulators will correct the deficiency.

"No adequate supply of the regulators is now available for treatment nor have all the facets of treatment been investigated."

It takes large quantities of blood serum to get a small amount of the regulator substances, Dr. Steinberg said. A quart of serum yields enough regulator for one injection.

So far, to avoid factors that might confuse the picture, only human serum has been used as a starting material. Whether regulators for human use can be taken from another animal, the rhesus monkey, for example, is unknown. This will not be determined until the Toledo team knows more about the chemistry and immunology of the regulators.

The regulators do exist in other animals, Dr. Steinberg said. The studies leading to their discovery were carried out in both humans and animals.

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and DNA, depending on the way each of the four nitrogen bases are arranged and distributed along the molecule. A word picture of a nucleic acid molecule would be: base-sugar (ribose or deoxyribose)-phosphate, repeated thousands of times, remembering that there are four kinds of bases. DNA's all contain deoxyribose; RNA's all contain ribose.

Drs. Cohn and Khym have worked out a way to chop the end base from a nucleic acid molecule. The method splits the molecule between the sugar and the phosphate, separating the end base-sugar combination from the rest of the molecule.

"So we've finished only half the problem," Dr. Cohn said. "Before we can get to the rest of the molecule we have to get rid of the phosphate molecule that blocks further degradation."

He thought the problem was licked with the isolation of a specific enzyme called a phosphatase, which splits phosphate from nucleic acid molecules. The drawback was that the enzyme was not specific for the end phosphate, as originally thought. It instead penetrated the molecule, breaking it up into smaller parts, confusing the issue.

Dr. Cohn thinks, however, that the discovery of the proper phosphatase is imminent. When that is accomplished, a long step will have been taken toward understanding the intimate molecular mechanism of heredity.

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## GENETICS

# Genes' Role Foreseen

► AN OLD CHEMISTRY technique used for a new purpose may spur the discovery of how genes dictate hereditary traits.

Dr. Waldo Cohn, an Oak Ridge National Laboratory biochemist, said he and his collaborator, Dr. Joseph Khym, have rediscovered an old chemical technique for systematically chopping portions of the nucleic acids—DNA and RNA—so that the genetic, or message-carrying portions, can be identified.

"The carrying and transfer of information is considered to lie in the nucleic acid molecules," said Dr. Cohn. "Efforts to read the code—that is, to determine the order of the bases along the chain—have been

hampered by inability to take the chain apart, one link at a time."

The bases are four slightly different nitrogen-containing compounds, Dr. Cohn reported at the Federation of American Societies for Experimental Biology meeting in Atlantic City.

There are two kinds of nucleic acids, ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). DNA is thought to be the gene, the master molecule that determines the color of our eyes or the shape of our nose. RNA is thought to direct the synthesis of protein, after first receiving its information from DNA.

But there are in turn several kinds of RNA



**FASTEST CAMERA**—A developmental RCA tube serves as an electronic shutter capable of shutter speeds up to two and a half billionths of a second. The camera, developed by Space Technology Laboratories, Inc., Los Angeles, Calif., can make pictures twice as fast as any previous photographic method.

## MEDICINE

**Methotrexate Cures 30 of 63 Cancer Cases**

► OF 63 PATIENTS with a highly malignant form of tumor, 30 are now free of evidence of the disease as the result of chemical treatment.

Three scientists from the National Cancer Institute reported results of the treatment with Methotrexate of choriocarcinoma which develops in the womb of pregnant women. The report was given at the American Association for Cancer Research meeting in Atlantic City.

Drs. Roy Hertz, John L. Lewis Jr. and Mortimer B. Lipsett said treatment in all cases consisted of intensive courses of this folic-acid antagonist. In 14 women treatment also included brief courses of a recently developed plant derivative called Vincalukoblastine.

The scientists said the uniquely favorable response of this rare form of cancer may be due to the fact that it originates from the cells and therefore may be more easily expelled from the mother's body.

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## MEDICINE

**Hope Seen for Victims Of Strokes, Rare Cancer**

► HOPE IS HELD OUT in reports on phases of the two leading causes of death, heart disease and cancer, in the *Journal of the American Medical Association*, 176:19, 1961.

Anticoagulant drugs have given protection to many persons who suffer temporary "warning" strokes, three researchers in the Mayo Clinic, Rochester, Minn., report.

In addition to the use of anticoagulant drugs, which will require further testing before any final conclusions are made, an editorial says surgical repair of the fixed atherosclerotic vessels in the neck is undergoing widespread application. However, it warns that other factors limit surgical treatment.

Drs. Robert G. Siekert, Clark H. Millikan and Jack P. Whisnant report on a study involving 230 patients with incipient stroke. Recurrent, passing attacks are due to a temporary inadequate supply of blood to a portion of the brain.

Among the treated group 83% escaped a full-blown and possibly fatal stroke, while only 50% of the untreated patients escaped.

Heart disease, including disorders of the veins, is the first cause of death. Cancer ranks second.

Malignant melanoma, a rare form of cancer, usually developing from a mole, is not a hopeless disease, two articles and an editorial say in the same journal.

Dr. Arthur G. James of University Hospital, Ohio State University Medical Center, Columbus, said the "curative possibilities" of this form of cancer are definite and the patient can also be offered "good and often long-term palliation."

In a series of 130 cases at the center, the 10-year study showed the survival rate to

be 32% for five years and 19% for 10 years. Surgery was the method of treatment in 120 of the cases.

Dr. Gordon McNeer of Memorial Hospital, New York, reports that when malignant melanoma is limited to the original site, five-year survival free of cancer is attained in 40% of the cases. Even when the disease spreads, Dr. McNeer said the outlook is not hopeless, even if less favorable.

Other articles in the AMA official magazine report that:

Palm reading may offer a clue to congenital heart disease.—Drs. Alfred R. Hale, John H. Phillips and George E. Burch, Tulane University School of Medicine, New Orleans.

A new compound for treatment of a fungus skin infection known as tinea versicolor has produced excellent results. Akrinol is the name of the new agent, 9-amino-acridinium 4-hexylresorcinolate.—Dr. Erwin H. Zimmerman of Huntington, N. Y.

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## MEDICINE

**Common Table Salt Can Poison Babies**

► LESS THAN A TABLESPOON of salt can severely poison a healthy infant, Dr. Laurence Finberg of Johns Hopkins University School of Medicine, Baltimore, Md., reported at the American Academy of Pediatrics meeting in Washington.

Severe brain damage or even death may result, Dr. Finberg said, pointing out that the diagnosis may be overlooked. The symptoms may be confusing to the pediatrician, especially if he does not know that the child swallowed an excessive amount of salt.

The pediatrician said it was not generally known that so small an amount can poison a baby. Although this is not a common occurrence, he presented information about two cases, one of which resulted in permanent brain injury.

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## CHEMISTRY

**Better Motor Oils From Thermal Diffusion**

► A NEW PROCESS uses "thermal diffusion" to concentrate oil molecules whose shapes give them superior lubricating ability.

Motor oils prepared by this process give 50% longer service than ordinary lubricating oils, H. E. Alford of Standard Oil Company's research department in Cleveland reported.

Laboratory tests showed very little thinning out at high temperatures and very little thickening at low temperatures. A four-month road test showed that there was a 35% decrease in oil consumption and a 50% increase in service life of the oil.

Drs. G. R. Brown and S. M. Darling were co-authors of the report, delivered at the American Chemical Society meeting in St. Louis.

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## GEOPHYSICS

**Deepest Hole Drilled In Ocean Floor**

► THE DEEPEST HOLE ever drilled in the ocean floor reached a final depth of 12,300 feet, nearly two and a half miles beneath the surface, the National Academy of Sciences and the National Science Foundation reported in Washington.

The drill penetrated through more than 600 feet of soft sediments and a dense rocky layer before it was retrieved by the drilling barge, CUSS I, near Guadalupe Island off the western coast of Mexico. The drilling is part of the preliminary phase of Project Mohole, whose eventual goal is to drill through the earth's crust to the underlying dense mantle.

The drill actually reached the heretofore unknown second layer of the ocean floor. Core samples taken 560 feet below the floor revealed the rock layer as basalt, a dense rock formed by the solidification of a once-molten material.

Scientists knew indirectly that the layer existed because seismic waves penetrating the soft ocean sediments bounced back when they hit the layer. Another hole that may reach even greater depths is now being drilled nearby.

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## GENERAL SCIENCE

**Top International Event For Teenaged Scientists**

► THE TOP international event for teenaged scientists will be held in Kansas City, Mo., when the 12th National Science Fair-International opens on May 10.

The official party is expected to total more than 1,000 persons. Some 380 finalists from more than 200 regional and area science fairs affiliated with the international program, conducted annually by SCIENCE SERVICE, will arrive May 8 and 9, accompanied by science fair directors, teachers and press representatives.

Science fairs being held this spring in this country, Puerto Rico, Canada, Japan, Thailand and the Army Dependents Schools in Germany, France and Italy will select their outstanding exhibitors for all-expense trips to compete at the 12th annual fair.

Cooperating with the National Science Fair-International, leading industries and organizations of the Kansas City area are making extensive preparations for the event.

Leo Roedl, executive secretary of Science Pioneers, is chairman of the committee at Kansas City. Dr. Max H. Thornton, vice president and technical director of Midwest Research Institute, is chairman of the executive committee for the fair.

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# THE FIELDS

## DENTISTRY

## Mayflower Genealogy Shows Poor Teeth Legacy

► AT LEAST TWO FAMILIES with Mayflower ancestry are not proud of their dental inheritance.

The defect they have inherited causes a brown opalescent appearance of the teeth. The disorder, called dentinogenesis imperfecta, softens the dentin, the substance immediately under tooth enamel. It is an inherited disease.

The two families with the dental disease were both descended from persons who came over on the Mayflower, Dr. Sidney B. Finn of the University of Alabama School of Dentistry, Birmingham, reported to a symposium on genetics related to dental health at the National Institute of Dental Research, Bethesda, Md.

It is entirely plausible, he said, that the families are related, since it would not be likely that two families with this defect would be on the historic ship.

In a survey of 96,000 children in Michigan, Dr. Finn reported, one in every 8,000 was found to have the disorder. It has been traced back hundreds of years in various families.

Although the tooth enamel is usually of a normal thickness, it fractures easily. The crowns wear easily and are frequently seen level with the gum line.

In spite of the softness of the dentin and the fact that the teeth often have small roots, jacket crown restorations have been retained in at least one case for 16 years.

The American Dental Association sponsored the symposium, which was the first to be held on dental genetics.

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## MEDICINE

## Hope Seen for Skid Row Chronic Alcoholics

► THERE IS HOPE for the skid row alcoholic.

Studies of some 40 chronic alcoholics who had been treated and then followed up by workers in the Temple University Alcoholism Project in Philadelphia were reported by Dr. Victor J. LoCicero, director of the project, sponsored by the department of psychiatry in the Temple University Medical Center.

The findings should be interpreted with caution because of the small number of patients who could be followed up, Dr. LoCicero told the National Council on Alcoholism meeting in Washington. But improvement was seen in some patients.

Patients who had been treated by group psychotherapy showed better control of drinking, and their tendency to relapse was 25% lower than among those untreated.

Some of them had left skid row and were renting on a longer-time basis. There was less use of free housing and transient quarters. Greater interest in marriage and family living, in organizations and religious affiliations were seen, and some of the treated patients were actually employed.

"One individual repaid some of the money loaned him," Dr. LoCicero said. "This was the first time in his life that he had repaid a debt. . . . Another participant remained sober and held a job for six months, after 20 years of chronic intoxication and inability to hold a job for more than a few days at a time."

Female group therapists get better responses than male therapists in attendance at meetings following discharge of prisoners, Dr. LoCicero reported.

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## MEDICINE

## No Lower Limit For Radiation Damage

► THERE IS NO lower limit to the amount of radiation that will cause damage to mice.

The problem of how much radiation is harmful to humans is still being investigated, Dr. William L. Russell of Oak Ridge National Laboratory, Oak Ridge, Tenn., reported. He told a symposium on dental genetics in Washington, D. C., that the effects of radiation exposures on mice showed no difference in mutation rates when dosages were equal over varying periods of time.

In his experiments with mice, Dr. Russell found that a dosage rate of 300 roentgens at 90 hours per week caused mutation rates equal to a dosage of 10 roentgens per week during 30 weeks.

During fluoroscopic examinations of humans, the dose rate to the gonads (sex organs) is probably not higher than 48 roentgens per hour, Dr. Russell said. He said the "genetic risk from such exposure would be somewhat lower than had been estimated on the basis of high dose rates."

Dr. James V. Neel of the University of Michigan Medical School said the next advances in dental genetics would come from a study of tooth structure.

"A tooth is not a plug of ivory sitting in our mouths," he explained. "It is active metabolically."

Inherited dental abnormalities will "play the same useful role that the inborn errors of metabolism do for medicine," Dr. Neel told the symposium, sponsored by the American Dental Association and supported by a grant from the National Institute of Dental Research.

Dr. Neel said that the possible effects of the genes are completely overshadowed by the effects of poor diet and poor dental hygiene. It is extremely difficult for the geneticist to determine what role inherited factors play in dental decay because of these nongenetic factors. He included among nongenetic factors "a diet rich in sugars and refined foods." He said changing dietary patterns make long-term studies difficult.

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## MEDICINE

## Use Steroids Cautiously, Pediatricians Warned

► HAZARDS as well as benefits result when corticosteroid drugs are prescribed for children's ailments, Dr. Thomas A. Good of the University of Maryland School of Medicine, Baltimore, cautioned in Washington.

Treatment with these drugs is indicated, Dr. Good told the meeting of the American Academy of Pediatrics, in such diseases as lymphatic leukemia, juvenile rheumatoid arthritis, progressive systemic sclerosis, meningeval tuberculosis, nephrosis and serious chest diseases, intractable asthma and sarcoidosis.

In most of the inflammatory diseases in which corticosteroids are used, an initial large dosage is required, but the dosage is then tapered to achieve the lowest maintenance required.

If there are side effects of major importance such as high blood pressure, inflammation of the blood vessels, mental disturbances, convulsions, peripheral neuritis, ulcers, fractures and diabetes, serious consideration should be given to stopping the steroid treatment.

Minor side effects can be controlled by simple measures such as diet, antacids, or tranquilizers, Dr. Good said.

Discontinuation of steroid therapy must be managed carefully. Rapid "weaning" should be avoided, as patients may actually appear to be addicted to a steroid.

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## PHYSICS

## Origin of Oceans Seen Related to Solar Wind

► THE OCEANS of the earth were formed when particles of hydrogen traveling from the sun changed to water when they reached the earth.

Hydrogen ions riding on a so-called solar wind combine with oxygen of the earth, forming droplets of water, Dr. C. M. de Turville of Bristol, England, reports in the British scientific journal *Nature*, 190:156, 1961. This process which has been occurring for billions of years, is still continuing.

Dr. de Turville says that if the total amount of hydrogen ions bombarding the earth throughout history was converted to water, the result would be an amount equivalent to the present volume of water stored by the oceans. Although some of the hydrogen particles are captured by the earth's magnetic field, the volume of water formed would still be approximately that found in the oceans.

About one and a half tons of hydrogen particles plummet to earth each second, the scientist estimates. The solar wind, which carries the particles, continually sweeps in from the sun at millions of miles an hour. The wind was measured recently for the first time when a U. S. rocket, laden with special instruments, was shot into space.

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## ASTRONOMY

# Mars Only Planet Now Visible

Three first magnitude stars are conspicuous in the south during May evenings. Mars is nearly 100,000,000 miles farther away than at Christmas, James Stokley reports.

► ALTHOUGH THE EVENING skies of May are devoid of brilliant planets, a number of bright stars are visible, as shown on the accompanying maps. These depict the skies as they look about 10:00 p.m., your own kind of standard time, at the beginning of May, an hour earlier at the middle of the month and two hours earlier at the end. (Add one hour for daylight saving time.)

The only planet indicated is Mars, half-way up in the west, in the constellation of Cancer, the crab. Last Christmas Mars approached to within 56,000,000 miles of earth. In the first half of May it will be about a hundred million miles farther, so it has faded greatly. It is now about equal to a bright star of the second magnitude.

Conspicuous among the stars now visible in the evening are three shining in the south, all of first magnitude. High in the southwest, in Leo, the lion, is Regulus, which is at the end of the handle (directed downward) of a smaller figure known as the sickle. The blade of the sickle is supposed to mark the lion's head, as he was depicted on the old star maps. To the left is a second magnitude star called Denebola, which marks the end of the tail.

Beginning under Denebola and extending toward the east is a group of stars that form the constellation of Virgo, the virgin. Among them is first magnitude Spica. And above the left-hand end of this group you will find Bootes, the herdsman, with brilliant Arcturus, also first magnitude.

## Antares Now Low in Sky

Close to the horizon, in the southeast, part of Scorpius, the scorpion, is shown. In it is the star Antares, which is usually also of first magnitude. Here, however, it is so low in the sky that its light has to pass through a great thickness of the earth's atmosphere. Thus it is shown with the third magnitude symbol. By July, however, it will be higher in the southern sky, and the whole constellation will be seen to better advantage.

Turning to the west, a few of the typical winter constellations, appearing for the last time, are visible. In the constellation of Gemini, the twins, you find Pollux (first magnitude) and Castor (second). To the left is Canis Minor, the lesser dog with Procyon; while Capella is to the right, in Auriga, the charioteer.

In the northeast shines bright Vega, in Lyra, the lyre. Below it is Cygnus, the swan, only part of which is visible. But in this part is the star Deneb, another bright orb that is dimmed by reason of low altitude. These groups will climb higher into the sky, and become more prominent, during summer evenings.

The "big dipper," which is part of Ursae Major, the great bear, is now in its best evening position of the year—high in the north. Below, in the direction indicated by the pointers (two stars in the dipper's bowl) is Polaris, the pole star, which we always see in the north. It is part of the little dipper and this in turn is part of Ursae Minor, the lesser bear.

About midnight in May, two more planets rise in the east. First comes Saturn, which is about equal to a first magnitude star; then Jupiter, which is about twelve times as bright. Both are in Capricornus, the sea-goat.

Mercury on May 1 will be behind the sun, but by the 31st it will have swung to its farthest east of the sun. Then it will set about an hour and three quarters after sunset. For a few days, around this time, you may be able to see it low in the west, before the sky becomes entirely dark.

In May Venus rises about one and one-half to two hours before sunrise, so you can see it in the morning twilight. On the 16th, a few days before the Soviet space probe is expected to pass close by it, the planet will have greatest brilliance. Then it will be at minus 4.2 on the astronomical magnitude scale. This will be about 7.6 times brighter than Jupiter. Venus will be

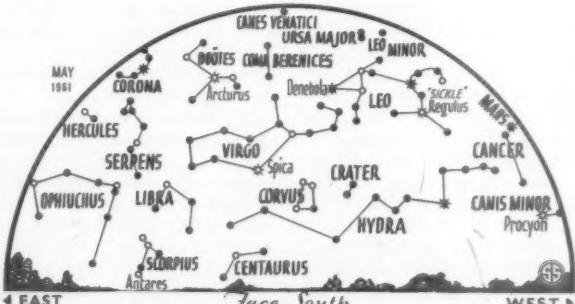
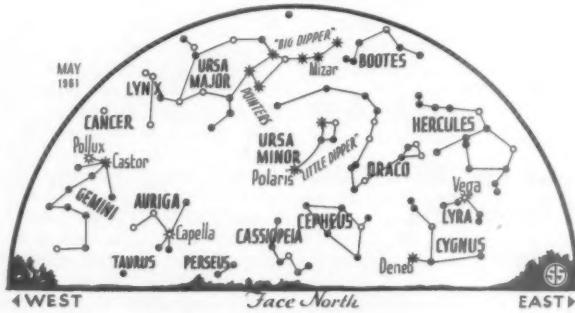
so bright that you can even see it in the sky after the sun has risen.

With space probes revealing more and more about the solar system and its members, astronomers are looking forward to finding answers to some of the puzzles concerning Mars. Unlike Venus, which is constantly covered with clouds, the surface of Mars can be seen. Astronomers have tended, quite naturally, to interpret what they saw in terms of what they knew to occur on earth.

When they observed white areas to appear around the poles of Mars during the winter, and to vanish when summer came, they assumed they were deposits of ice and snow. The green areas that appeared nearer the Martian equator in spring, only to turn brown in autumn, were interpreted as areas of some sort of vegetation. That is the way vegetation of earth would look from Venus, for example.

Astronomers have seen yellow clouds over Mars, occasionally hiding the surface completely. These, it was thought, were sand and dust storms, blown up by strong winds.

But there are objections to these ideas. The atmosphere of Mars seems to be very thin, a little more dense than that of the earth above Mt. Everest. Air so thin could hardly hold so much dust, or sand. And studies of the light of Mars, analyzed through the spectroscope, have failed to reveal the presence of either water vapor or oxygen in the atmosphere. Both substances



• • • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

would have to be there, if there is ice and snow, or vegetation.

In a report to the Astronomical Society of the Pacific, three astronomers of the Georgetown University Observatory, Washington, D. C., Drs. C. C. and H. K. Kiess, and S. Karrer, suggest a new interpretation of the Martian features. They attribute the effects to oxides of nitrogen—combinations of that element with oxygen.

Originally, perhaps, the atmosphere did contain oxygen and water vapor, along with nitrogen, in a composition much like our atmosphere. But the water has all been decomposed by the action of light, or has entered into combination with minerals on the surface. The oxygen combined chemically with other surface elements, as well as with nitrogen in the atmosphere. Thus would have formed the oxides of nitrogen, of which there are a number.

Several of these, the scientists propose, could exist in the atmosphere of Mars. One of these is nitrogen tetroxide, made of molecules consisting of two atoms of nitrogen and four of oxygen ( $N_2O_4$ ).

When it becomes cold enough around the poles, according to their theory, the nitrogen tetroxide would deposit on the ground in solid form, in which it is chalky-white. As the temperature rises, it sublimes, that is, it goes directly to a gaseous phase without becoming a liquid. Then as the gaseous nitrogen tetroxide, probably combined with nitrogen dioxide ( $NO_2$ ), moves towards the other pole, it changes the color of mineral deposits along the way, producing the blues and greens that are observed. Later these would revert back to their former brownish hues.

"From our viewpoint," the Georgetown scientists report, "the yellow clouds are masses of nitrogen dioxide ( $NO_2$ ) gas of greater than normal concentration, formed whenever local or area-wide warming occurs on the surface or in the lower atmosphere of the planet. The transparent nitrogen tetroxide will dissociate into the dioxide with its characteristic yellow color. Color saturation will depend on the concentration of the  $NO_2$  molecules. When the temperature falls, the  $NO_2$  molecules will again recombine to form  $NO_4$  gas, and the yellow veil will disappear."

If such an explanation is correct, they point out, "it will be necessary to abandon all ideas of Mars as an abode of life." The mixture of nitrogen dioxide and tetroxide, they note, "in small amounts is noxious to plants, and in larger amounts to animals. Near our urban centers, it is one of the pollutants causing damage to vegetation."

### Celestial Time Table for May

May	EST
1	6:00 p.m.
6	7:00 a.m.
	7:00 p.m.
11	11:00 a.m.
14	11:55 a.m.
15	5:00 p.m.
16	3:00 p.m.
20	1:00 p.m.
22	11:19 a.m.
29	11:38 p.m.
31	11:00 p.m.

Mercury behind sun  
Moon passes Saturn  
Moon nearest, distance 229,600 miles  
Moon passes Venus  
New moon  
Moon passes Mercury  
Venus at greatest brilliancy  
Moon passes Mars  
Moon in first quarter  
Full moon  
Mercury farthest east of sun  
Subtract one hour for CST, two hours for MST, and three hours for PST.

\* Science News Letter, 79:250 April 22, 1961

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# Books of the Week

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D.C.

**AFRICA A TO Z: A Guide for Travelers, Armchair and Actual**—Doubleday, 408 p., maps, photographs, \$4.95. Background information for the tourist of the new Africa, describing 56 countries, from Alexandria to Zululand, from Accra to Zanzibar.

**ALTERNATING CURRENT ELECTRICITY**—Alexander Efron—*Rider, J. F.*, 96 p., illus., paper, 2.25. Advanced high-school or junior college level text.

**AMERICAN DRUG INDEX 1961**—Charles O. Wilson and Tony Everett Jones—*Lippincott*, 791 p., \$6.75. For identification and correlation of pharmaceuticals available to the medical and allied professions.

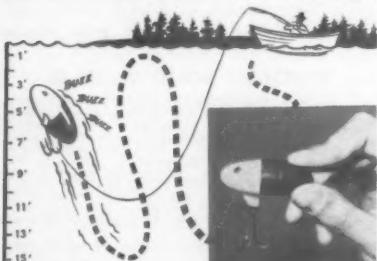
**AMERICAN WELFARE**—Alfred de Grazia and Ted Gurr—*N. Y. Univ. Press*, 470 p., \$6.50. National survey of welfare activity in the United States, from neighborhood, community, state, fraternal, labor union, and foundation, to federal government operations.

**CASE STUDIES IN WORLD GEOGRAPHY: Occupance and Economy Types**—Richard M. Highsmith, Jr., Ed.—*Prentice-Hall*, 218 p., illus., paper, \$3.95. Detailed examples demonstrating aspects of geographical methodology.

**THE CELL: Biochemistry, Physiology, Morphology**. Vols. IV and V: **Specialized Cells**, Parts 1 and 2—Jean Brachet and Alfred E. Mirsky, Eds.—*Academic*, 511 p., 597 p., illus., \$18, \$20. Part 1 deals with viruses, visible organization of bacteria, protozoa, neuron, and muscle cells. Part 2, with gland, kidney and blood cells, bone and pigment cells, antibody formation, and cancer cells.

**CHARLES DARWIN: The Founder of the Theory of Evolution and Natural Selection**—Gerhard Wichler—*Pergamon*, 228 p., illus., \$6.50. Develops in detail the history of descent and selection, the basis and treatment of these ideas by Darwin, and certain aspects of Darwin's life.

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**CHILDREB WITH HYPNOSIS**—William S. Kroger, M.D.; Jules Steinberg, Ed.—Doubleday, 216 p., illus., \$3.95. Gynecologist discusses the background, technique and advantages of hypnosis in obstetrics.

**CONCEPTS OF MEDICINE: A Collection of Essays on Aspects of Medicine**—Brandon Lush, Ed.—*Pergamon*, 286 p., \$8.50. Essays deal with such subjects as specialization, teachers of medicine, professional collaboration, the meaning of normal, and the selection, care and preservation of research scientists.

**ESSENTIALS OF CHEMISTRY IN THE LABORATORY**—Harper W. Frantz and Lloyd E. Malm—*Freeman*, 308 p., illus. by Roger Hayward, paper, \$3.30. Teachers edition with instruction manual.

**FARADAY AS A DISCOVERER**—John Tyndall, introd. and notes by Keith Gordon Irwin—*Crowell*, 213 p., illus., \$2.75. Memorial biographical sketch on Faraday's research activities and lectures, by the superintendent of the Royal Institution (1867-1887).

**THE FINGER LAKE REGION: Its Origin and Nature**—O. D. von Engel—*Cornell Univ. Press*, 156 p., illus., \$4.50. Geologist presents the unique topographic and structural elements of the Central New York lakes region, in language understandable to the layman.

**FLORA OF THE SANTA CRUZ MOUNTAINS OF CALIFORNIA: A Manual of the Vascular Plants**—John Hunter Thomas—*Stanford Univ. Press*, 434 p., illus., \$8.50. Distributional notes, keys to families, covers about 1,800 species, subspecies and hybrids of ferns, conifers and flowering plants.

**FROM DRY PLATES TO EKTACHROME FILM: A Story of Photographic Research**—C. E. Kenneth Mees—*Ziff-Davis*, 312 p., illus., \$5.95. An account of the development of photographic science and of modern photographic technology by the founder of the Kodak Research Laboratories.

**GARDEN SHRUBS AND TREES**—S. G. Harrison, Key to Genera by R. D. Meikle—*St. Martins*, 318 p., illus. by Ann V. Webster and Ernest Petts, \$4.95. Handsomely illustrated, authoritative British garden guide.

**HANDBOOK OF CALIFORNIA BIRDS**—Vinson Brown and Henry G. Weston, Jr.—*Naturegraph*, 156 p., illus., \$4.50; paper, \$2.95. Describes 368 species, with color plates for quick identification.

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**L. Sprague de Camp—Doubleday**, 290 p., \$4.50. Tells of 32 American inventors who, between 1830 and World War I, in their own small laboratories accomplished feats that revolutionized our way of life.

**ICELAND SUMMER: Adventures of a Bird Painter**—George Miksch Sutton—*Univ. of Okla. Press*, 253 p., illus. by author, \$5.95. Ornithologists' story of adventures and observations while painting northern birdlife.

**INTERIM AEROSPACE TERMINOLOGY REFERENCE**—Dept. of the Air Force—*OTS*, 75 p., paper, \$2. Definitions of terms, from "ablating materials" to "Zuni" rocket.

**AN INTERNATIONAL PEACE CORPS: The Promise and Problems**—Samuel P. Hayes—*Public Affairs Institute*, 96 p., paper, \$1. Social scientist's study and recommendations for aims, organization and administration of the Peace Corps.

**THE LIGHTNING BOOK**—Peter E. Viemeister—*Doubleday*, 316 p., illus., \$4.50. Provides the general reader with a broad understanding of the more significant aspects of lightning.

**THE MAGIC OF RAYS**—Johannes Dogigli, transl. from German by Charles Fullman—*Knopf*, 264 p., photographs, \$5.75. Describes how different rays may be produced and tells non-scientific reader what practical applications are made of each group of rays.

**MODERN INDOOR GARDENING: Including Window Boxes**—G. F. Gardner—*Macmillan*, 150 p., photographs, \$4.50. Gives details on care of plants suitable for indoor cultivation.

**NATIONAL SECURITY IN THE NUCLEAR AGE: Basic Facts and Theories**—Gordon B. Turner and Richard D. Challener, Eds.—*Praeger*, 293 p., \$6. Essays, both historical and theoretical, dealing basically with the "limited war" aspects of military preparedness.

**THE NATURE OF VIOLENT STORMS**—Louis J. Battan—*Doubleday*, 158 p., illus., paper, \$9.50. Explains the physics of weather in terms of thunderstorms, tornadoes, hurricanes and cyclones. PSSC series for young adults.

**PHYSICS FOR ENGINEERS AND SCIENTISTS**—Richard G. Fowler and Donald I. Meyer—*Allyn*, 2nd ed., 553 p., illus., \$9.25. Introductory course, presenting formal calculus manipulations wherever needed.

**PLUTONIA**—Vladimir Obruchev, transl. from Russian by Faina Solasko—*Criterion Bks.*, 233 p., illus. by G. Nikolsky, \$3.95. Russian Academician-geologist's version of Jules Verne's "Journey to the Center of the Earth," science fiction designed to interest young people in the science of geology.

**PRINCIPLES OF ELECTRICITY AND MAGNETISM**—Emerson M. Pugh and Emerson W. Pugh—*Addison-Wesley*, 430 p., illus., \$9.50. Designed for two-semester course, using advanced mathematical methods.

**ROCKETS, MISSILES AND SPACE TRAVEL**—Willy Ley—*Viking*, rev. ed., 556 p., illus., \$6.75. Appendixes include material up to 1960.

**SCIENCE IN SPACE**—L. V. Berkner and Hugh Odishaw, Eds.—*McGraw*, 458 p., illus., \$7. Thorough coverage by outstanding authorities, analyzing the achievements and new scientific opportunities offered by space science. Directed to research workers, but also of interest to the general reader concerned about the national space effort.

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**SOURCES OF INFORMATION AND UNUSUAL SERVICES**—Raphael Alexander, Ed.—*Informational Directory Co.*, 6th ed., 84 p., paper, \$2.95.

Lists information and pamphlets available, arranged under 524 diverse subject headings.

TV TROUBLE ANALYSIS—Harry Mileaf—*Gernsback*, 224 p., illus., \$4.95; paper, \$3.20. For the technician.

A TAXONOMIC AND BIOLOGICAL STUDY OF THE GENUS *XYELA DALMAN* IN NORTH AMERICA—Donald J. Burdick—*Univ. of Calif. Press*, 71 p., illus., paper, \$1.50.

TEACH YOURSELF ATOMIC PHYSICS—J. M. Valentine—*Macmillan*, 192 p., illus., \$1.95. Tries to cover, with a minimum of mathematics, structure of the atom, and the behavior of electrons and of atomic nuclei.

TERNARY SYSTEMS: Introduction to the Theory of Three Component Systems—G. Masing, transl. from German by B. A. Rogers—*Dover*, 173 p., illus., paper, \$1.45. Unabridged reprint of 1944 edition.

THE THEORY OF EQUATIONS with an Introduction to the Theory of Binary Algebraic Forms, Vol. I—William Snow Burnside and Arthur William Panton—*Dover*, 7th ed., 286 p., paper, \$1.85. Reprint.

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WILLIAM CHANDLER BAGLEY: Stalwart Educator—I. L. Kandel—*Teachers College*, 131 p., photo., \$3.50. Account of the aims and work of one of the founders of Kappa Delta Pi.

WILLIAM JAMES/PSYCHOLOGY: The Briefer Course—Gordon Allport, Ed.—*Harper*, 343 p., paper, \$1.85. Reprint of 1892 text omitting dated chapters dealing with sensory processes.

WONDER WORKER: The Story of Electricity—Walter Buchr—*Morrow*, 96 p., illus., \$3. For boys and girls.

THE WONDERFUL WORLD OF ENGINEERING—David Jackson—*Garden City Bks.*, 94 p., illus., \$2.95. Picture-book style presentation of great engineering feats.

• Science News Letter, 79:252 April 22, 1961

## INVENTION

# Patents of the Week

**A method of freezing foods at very low temperatures, safe replanting of trees and an instrument for stunning animals to be slaughtered have been patented.**

► A METHOD OF PRESERVING foods by freezing them at unusually low temperatures has been patented.

Frozen foods packed by this method have been shipped from New York to such far off lands as Japan and Ceylon, arriving in perfect frigid condition as much as six weeks from the time they were frozen, inventor Willard Langdon Morrison of Lake Forest, Ill., claimed. British soldiers on maneuvers in Asia and Americans vacationing in Bermuda were fed with food preserved by the method awarded patent No. 2,978,336. Patent rights were assigned to Liquefreeze Company, Inc., New York City.

"Within the next 10 years, all frozen foods will be packed in this way," Mr. Morrison predicted.

The relatively simple process uses liquid nitrogen to freeze food. A nozzle, connected to a supply of liquid nitrogen, is poked into the food to be preserved. The liquid nitrogen, which boils at the frigid temperature of minus 320 degrees Fahrenheit, filters through the material, and evaporates when it touches the relatively warm food surfaces. The resulting nitrogen gas drives all the air from the food's airtight container, and the frozen food is then sealed.

It can then be transported by insulated trucks, freight cars or ships to points throughout the world. No compressor units or ice is needed when transporting, the inventor claimed. The prolific inventor

has more than 200 patents issued to him, many in the "cryogenic" or low temperature field.

Fully grown trees can be uprooted and replanted without killing the tree, inventor Lewis C. Pearce of Berea, Ohio, stated in patent No. 2,977,716, assigned to Pearce Development Company of Cleveland, Ohio. A deep trench is dug around the tree and a cable is dropped down, girdling part of the tree. The two ends, attached to a pulley system, are alternately tugged by motors, producing a cutting action that separates the tree core from the surrounding earth.

An electric instrument that stuns an animal before it is slaughtered in the packing houses won patent No. 2,977,627 for Roy E. Morse of New Brunswick, N. J., and Fred A. DiPasquale of Chicago, Ill. Patent rights were assigned to Reliable Packing Company, also in Chicago. The patented device can be applied without the animal being aware of the impending doom.

Charting the depths of ocean waters with an echo sounder parachuted from an airplane is envisioned in patent No. 2,978,668, assigned to the U.S. Navy by winners Franz N. D. Kurie of Alexandria, Va., and Louis A. Cartwright of San Diego, Calif. As soon as the instrument smacks the water's surface, radio signals recording the depth begin operating immediately. The signals are picked up by an observer at a remote station or in an airplane.

• Science News Letter, 79:253 April 22, 1961

## MEDICINE

# White Blood Cells Change

► THE BLOOD OF ADULTS contains white cells that can develop into other cells necessary for healthy tissue. Vitamin C is apparently necessary for this cell change.

White blood cells were placed in dime-sized boxes and planted under the skin of humans by Dr. Nicholas L. Petrakis, University of California Medical Center. The boxes, called diffusion chambers or micro-pore filters, had holes large enough to let the fluid part of the blood and some of its particles flow through it, but so small that the blood cells outside could not enter the box nor white cells inside leave it.

The researchers found that the white cells could change into three different kinds of cells. They formed scavenger cells that eat up foreign substances, fibroblasts that make the cell "backbone" and fat cells.

Malignant white cells of leukemia could not change. When placed in normal people and in leukemic patients, they continued to

produce more leukemic cells. Normal white cells from healthy people, however, could change even under the skin of leukemic patients.

White cells normally contain large amounts of vitamin C, which is essential for nutrition and healing wounds. White cells from guinea pigs that had been deprived of vitamin C were placed in boxes and buried under the skin of healthy guinea pigs. The cells became normal after several days.

White cells removed from healthy guinea pigs and boxed under the skin of animals with scurvy developed almost normally for five to seven days. Then they began to pile up in formless heaps within the box; they divided rapidly and became monstrously large. The guinea pigs were then put on diets rich in vitamin C. The white cells and the guinea pigs regained their health.

• Science News Letter, 79:253 April 22, 1961

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## MEDICINE

# Hope for Schistosomiasis

► ONE OF THE WORLD'S oldest scourges, schistosomiasis or blood fluke disease, may be countered in the future with a new immunization technique that uses harmless flukes to induce resistance to the dangerous ones.

This means that there is new hope for millions of people in South America and the Far East, where at least one of the three major blood flukes has been a menace for centuries. In Africa, plagued by two of the blood flukes, the significance of the new find is even greater.

The technique is now being refined in the rhesus monkey, as much like man as man himself so far as blood fluke infection is concerned. It is being developed by two Chinese scientists, Drs. S. Y. Li Hsu and H. F. Hsu, a husband and wife team working at the State University of Iowa. They report their work in *Science*, 133:766, 1961.

Both the rhesus and man are susceptible only to human blood fluke strains. Although the researchers are now concentrating on strains of one particular species, the Japanese blood fluke, technically known as *Schistosoma japonicum*, they believe the new technique will be just as effective with other blood flukes.

Normally an immature fluke enters the body by penetrating the skin, which causes a rash of bumps that look like flea bites. Once inside the body, the fluke begins to

dig its way through the tissues and finally reaches the blood stream. There it mates and lays its eggs. The eggs reach the intestine or the bladder, pass out of the body, work their way into a certain kind of snail, grow a bit and leave the snail to look for another human. The bodily migrations of the worms and the eggs they lay cause serious damage to the liver, and, in some cases, the nervous system.

Certain "non-human" strains of the fluke, however, cannot survive long enough, in the human or monkey, to do any serious damage, but they do survive long enough to do some good. This is the basis of the new immunization technique.

When the young fluke of the non-human strains are injected into a subject, antibodies are built up to the human strain as well. So far the subjects have been rhesus monkeys and their acquired resistance to the human strains has not stopped the flukes completely. But results are so promising that the researchers hope to render complete immunity by adjusting timing, dosage and number of inoculations.

Conquest of these parasites would be a welcome medical accomplishment. The blood fluke scourge is so old that evidence of it has been found even in Egyptian mummies.

\* *Science News Letter*, 79:254 April 22, 1961

## MEDICINE

# Oral Polio Vaccine Given

► HARRISBURG and surrounding communities in Dauphin and Cumberland counties, Pa., will have no polio cases this summer if an oral polio vaccination program begun April 6 is as effective as predicted.

All persons, including those previously inoculated with Salk vaccine, in a population area of 240,000 have been asked by local doctors to participate in the program. The Dauphin County Medical Society, made up of 322 physicians, will staff 16 immunization points located throughout Greater Harrisburg, covering both counties.

Three doses of the vaccine will be given in Harrisburg at five- to six-week intervals. The first dose is with the Type I strain, which protects against the virus responsible for 80% of paralytic polio cases. Vaccines from Type II and Type III strains are tentatively scheduled to be given May 11 and June 15.

Two drops of the vaccine will be swallowed. Babies under the age of one year will receive their dose from a dropper. Children will be spoon-fed a sugared vaccine mixture and adults will be given paper cups containing the two drops of vaccine mixed with a half-ounce of distilled water. The adult dose is tasteless.

Chas. Pfizer & Co., Inc., is supplying the

vaccine without charge. The company is farthest ahead on production of the Sabin oral vaccine because of work done in its British plant.

The U.S. Public Health Service has approved regulations for licensing oral, live poliovirus vaccine, but so far no pharmaceutical company has been licensed to sell the product.

\* *Science News Letter*, 79:254 April 22, 1961

## Questions

**MEDICINE**—What substance was injected into leukemia patients? p. 247.

**ROCKETS AND MISSILES**—How long did it take the Russian astronaut to circle the earth? p. 243.

**Photographs**: Cover, Convair Division of General Dynamics Corporation; p. 243, United Press News Photo; p. 245, National Cylinder Gas Division of Chemetron Corporation; p. 247, Radio Corporation of America; p. 256, Eastman Chemical Products.

## VETERINARY MEDICINE

**Control of Coccidiosis Foreseen for Farmers**

► SCIENTISTS BELIEVE they soon will be able to control coccidiosis, a parasitic disease that costs livestock and poultry owners \$50,000,000 per year.

Dr. John C. Lotz and R. G. Leek, parasitologists with the United States Department of Agriculture, reported in Washington that the attack on coccidiosis will be double-barreled. One method consists of giving drugs to animals before they get the disease, and the other will be the spraying of fields where diseased animals have been.

The object of both techniques is to disrupt the normal life cycle of the parasite as it passes through the digestive tract of one animal, to the field, and into another animal.

The infective, egg-like, coccidial cysts, picked up from the field in forage, feed or water, can hatch inside the host animal only under certain conditions. If the shell of the cyst is not broken at the right time by the action of enzyme and bile, the parasite cannot mature and produce another generation of cysts.

Drugs that interfere with hatching action could be used to control the parasite within the animal host, the investigators reported in Agricultural Research, April, 1961. Enzyme-like sprays that destroy the shell of the cyst and expose the parasite to the elements could be used to kill off cysts lying in fields, waiting to be swallowed.

Thus livestock and poultry owners would have effective methods for fighting the disease while it is outside the animal, as well as when it is inside the host.

• Science News Letter, 79:255 April 22, 1961

## BIOLOGY

**Tumor Transplants "Take" in Mother Mice**

► TRANSPLANTED MOUSE tumors ordinarily rejected will "take" in female mice after they bear offspring.

A study reported at the American Association for Cancer Research meeting in Atlantic City, N. J., indicated that the immune response in females that had borne offspring was modified in a specific way.

This finding is of particular importance in light of increased research on the role of immunity in resistance to human cancer.

Drs. Edward J. Breyere and Morris K. Barrett of the National Cancer Institute, Bethesda, Md., said the transplant would only be effective for a tumor from the strain of mice that sired the offspring.

Among inbred mice, a number of genes governs susceptibility and resistance to transplantation of tissue from members of one strain to those of another. Only when the strongest of these genes is alike in two strains is a transplant usually successful. Otherwise, the recipient may be immune.

Dr. Breyere, who was formerly at the institute, is now at American University, Washington, D. C.

• Science News Letter, 79:255 April 22, 1961

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• **FLY-OR-DRIVE VEHICLE** without wings, powered with one turbine-jet engine for lift and thrust and a smaller one of same type for wheel-drive, is being studied by a British aircraft constructor. Designed to be gyro-stabilized so a competent motorist could handle it, the vehicle is part of an investigation into the future of dual purpose lift/thrust engines. There are no plans for its immediate manufacture.

• Science News Letter, 79:256 April 22, 1961

• **PERSONAL BRANDING IRON** of satin finished solid bronze head with Gothic letters insures the return of borrowed garden tools, athletic equipment or other items. It is available in choice of any three letters.

• Science News Letter, 79:256 April 22, 1961

• **VACUUM CLEANER TOOL**, with an adapter to fit all standard vacuum hoses, consists of an especially designed brush and small diameter plastic tubing. It will safely and thoroughly clean art objects, hobby models, picture frames, figurines, and anything not reached by ordinary vacuum tools.

• Science News Letter, 79:256 April 22, 1961

• **GEIGER COUNTER KIT**, shown in the photograph, for "do-it-yourself" young scientists provides materials to construct a



Geiger counter and perform experiments in radioactivity. Powered by standard batteries, the assembled Geiger counter is housed in a transparent plastic bubble mounted on a wooden base. The experiment manual contains complete instructions.

• Science News Letter, 79:256 April 22, 1961

• **STYLISH SUNGLASSES** have lenses made to same specifications as regular

glasses to protect from glare and give visual comfort. Graceful frames feature hand-engraved patterns and delicate color combinations.

• Science News Letter, 79:256 April 22, 1961

• **SIDE ARM SCREW DRIVER** has T-handle that converts regular screw driver into high torque driver, providing a turning force previously unattainable in non-power tools. Driver comes complete with two interchangeable blades: regular blade and No. 2 point Phillips blade.

• Science News Letter, 79:256 April 22, 1961

• **TOOL WRAP PAPER** protects metal surfaces against rust without having either to oil or grease them. Patented chemical provides a rust-preventive vapor that remains effective over long periods. Each box contains 45 feet of paper 18 inches wide.

• Science News Letter, 79:256 April 22, 1961

• **TRAVEL CLOCK-RADIO** has a six-transistor superheterodyne circuit powered by three penlight batteries, and a 24-hour alarm clock that may be set to turn a buzzer alarm or the radio on and off automatically. Fourth battery operates a built-in night light. The set includes a plug-in earphone for private listening.

• Science News Letter, 79:256 April 22, 1961



## Nature Ramblings



## Do You Know?

► **THE BLUEBIRD** is second only to the robin in popular affection and familiar recognition. As a matter of fact, he is known in some sections as "blue robin" and "blue redbreast." Like the robin, the bluebird is a thrush; the two of them belong to the minstrels' aristocracy of the feathered world.

The bluebird's return from his southern sojourn is a little later than the robin's; but he will return, sometimes fighting northward obstinately against the chill and stormy weather. There can hardly be a neighborhood in the northern part of our country that has not by now had its wave of bluebird migration.

The bluebird shares with the robin a willingness to be good neighbors with human beings. Indeed, he is a little easier to induce to accept a place as a tenant. Because of his fondness for nesting in natural hollows, such as decayed stumps of limbs, he takes readily to bird-boxes. And he is a very useful tenant, earning his keep by ravaging the insect population, and making little or no trouble as a fruit thief. In this he has rather the better of his cousin, the robin.

### Bluebirds



Throughout the United States, there are three different kinds of bluebirds.

The common or eastern bluebird, with its blue back and red breast, sings its simple "chur-wi" from the Gulf of Mexico to the Great Lakes.

The western or Mexican bluebird, which ranges along the Pacific Coast, has the red breast of the eastern species but is a darker, purplish blue and has a chestnut band on its back.

But high up in the mountains of the western United States is the bluest bird of them all. This is the mountain bluebird with both blue back and breast, and not a single red feather.

• Science News Letter, 79:256 April 22, 1961

Powdered alumina, or aluminum oxide, is used in making refractory bricks and cements, spark plugs, insulators, and porcelain and glass mixes.

*Brucellosis*, a serious livestock disease that also affects humans, has been completely eradicated from New Hampshire and in 22 counties in six other states.

The mean sea level has risen appreciably throughout most of the world during the last century.

A solar furnace on the moon has been suggested to provide water, oxygen, nitrogen, food and power for future United States astronauts.

Flowers, trees and other vegetation are important aids in prospecting for ores and minerals used by the steel industry.

There are about 300,000 plant species growing throughout the world, yet only 3,000 have been tried for food use.

A modern electronic brain can multiply numbers as large as one billion at a rate of more than 400 per second.

• Science News Letter, 79:256 April 22, 1961

